

REMARKS

Claims 1-5, 10-15 and 20-23 are pending in the application. Claims 15, 20 and 23 are rejected. Claims 21 and 22 are objected to. Claims 1-5 and 10-14 are allowed. Claims 15, 20 and 23 are herein amended.

Claim Rejections - 35 U.S.C. §112

Claims 15, 20 and 23 are rejected under 35 U.S.C. §112, second paragraph. The Examiner asserts that claim 15 is structurally indefinite, as it is not clear how the first green sheet is “serviceable as a material for the first ceramic layer and the first green sheet”. The Examiner further asserts that the relationship between the first ceramic layer and the second ceramic layer is unclear.

Applicants herein clarify claims 15 and 23 to clearly recite the invention.

In claim 20, the Examiner asserts that the last phrase is indefinite because it is unclear what layer is “having the same composition as the second ceramic layer”. Applicants herein amend the claim to provide clearer paragraphs and to spell out which layers have the same composition as the second ceramic layer.

Such amendments should clarify that it is the surface layers of the first ceramic layer that are compositionally the same as the second ceramic layer.

Claim Rejections - 35 U.S.C. §102

Claim 15 is rejected under 35 U.S.C. §102(b) as being anticipated by Kanba et al. (U.S. Patent No. 5,294,477).

The Examiner characterizes the cited reference by noting that its layers are a mixture of metal and an insulating ceramic composition. The layers have a functionally gradient structure so that the abundance ratio of the metal component to the insulating ceramic composition changes in the direction of thickness.

The cited reference shows a pre-ceramic layer for a laminate structure, the pre-ceramic layer varying in composition in its thickness, and having the same shrinkage as a second, imaginary pre-ceramic layer. Although the second pre-ceramic layer exhibiting a similar rate of shrinkage at its area of contact with the first green sheet is not taught by the reference, the Examiner appears to take the position that such a second green sheet probably exists, and that this is enough for the rejection.

Applicants herein amend claim 15 to essentially recite the unfired composite of the first and second green sheets. Applicants submit that this positive recitation of the second green sheet should overcome the present rejection for anticipation, because not all of the claimed limitations would then be present.

Claim Rejections - 35 U.S.C. §103

Claims 20 and 23 are rejected under 35 U.S.C. §103(a) as being unpatentable over Seyferth et al. (U.S. Patent No. 5,455,000).

The Examiner asserts that Seyferth discloses a functionally gradient material comprised of a plurality of layers. The stacked layers having the functionally gradient material with changing the components ratio outwardly from the middle intermediate layer or from one direction.

The Examiner asserts that it would have been obvious to put a plurality of composite layers which having functionally gradient material because it can control shrinkage during the firing process (col. 2, lines 60-65).

Applicants herein clarify the claims. Subsequently, Applicants respectfully disagree with this rejection, because not all of the claimed limitations appear to be present in the cited reference, and there does not appear to be a suggestion to modify the cited reference to meet the claimed invention. Claim 20 requires a laminate structure of a first ceramic layer and a second ceramic layer, the first ceramic layer having a three-layer structure comprising an intermediate layer, and a pair of surface layers, wherein the surface layers are arranged on opposite sides of the intermediate layer and have the same composition as the second ceramic layer.

The cited reference, while indicative of a multilayer structure, does not show this structure. While a multilayer structure is part of the claimed invention, the Examiner appears to use the general suggestion of “controlling shrinkage during the firing process” as a suggestion to enclose the intermediate layer of the first ceramic with the same material as the second ceramic layer. The Examiner appears to use impermissible hindsight as a reason to retroactively construct Applicants’ invention.

With respect to claim 23, it appears that the cited reference shows a pre-ceramic layer having a multi-layer structure comprising an intermediate layer, and a pair of surface layers arranged on opposite sides of the intermediate layer, and which may have the same composition as another green sheet.

As in response to the rejection of claim 15 above, Applicants herein amend claim 23 to positively recite the second green sheet as in Claim 15. Applicants subsequently submit that not all of the claimed limitations are taught or suggested by the cited reference.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP



Kenneth H. Salen
Attorney for Applicant
Registration No. 43,077

KHS/led
1250 Connecticut Avenue, NW
Suite 700
Washington, D.C. 20036
(202) 822-1100

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